**REMARKS**

Claims 1-19 are pending, including independent claims 1, 5, and 7.

At the outset, the Applicant acknowledges with appreciation the Examiner's reconsideration and withdrawal of the rejections raised in the prior Action based on the Rabe and Warnke documents.

In the final Action, claims 1-3, 5-11, and 13-15 are finally rejected for anticipation by U.S. Patent No. 6,134,336 to Clark. Claims 4 and 12 are finally rejected for obviousness over Clark. Also, claims 16-19 stand finally rejected for obviousness over Clark in view of U.S. Patent No. 6,381,126 to Yoshimoto et al. ("Yoshimoto"). The Applicant believes the pending claims are allowable over the cited documents for the following reasons.

Anticipation requires that every feature of the claimed invention be shown in a single prior document. *In re Paulsen*, 30 F.3d 1475 (Fed. Cir. 1994); *In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999). The pending claims positively recite features that are not described in the cited document.

For example, claim 1, recites, among other things, "an acoustic horn having an acoustical impedance matched with impedances of an ear and the driver, wherein the acoustic horn has a cross-sectional area that generally increases from a small end proximate the driver to a large end". The Office asserts that the recited acoustic horn reads on Clark's housing portion 116 shown in FIG. 5, but the assertion is incorrect.

Apparently, the Office's position is that the recess 418 in the housing portion 116 of Clark's arrangement forms the recited acoustic horn. Such a broad interpretation of Clark's recess 418 (referred to by Clark as a "recess" and not as an "acoustic horn") disregards the ordinary meaning of the term "acoustic horn" as would be understood by persons skilled in the art at the time the invention was made. Such a construction is improper. *See, e.g.*, MPEP §§ 2173.02 and 608.01(o).

For example, the Radio Shack Unabridged Dictionary of Electronics defines an acoustical horn as a "tube of varying cross section having different terminal areas which change the acoustic impedance to control the directivity of the sound pattern" (a portion of cited page is attached for reference). The Applicant's use of the term

"acoustic horn" in the specification, as well as the horn's depiction in the drawings, is consistent with the plain and ordinary meaning as understood by those skilled in the art. Moreover, these characteristics of an acoustic horn, well understood by those skilled in the art at the time of the invention, need not be expressly recited in the claims, as the characteristics are inherent by use of the term of art "acoustic horn".

Nowhere does Clark describe that the recess 418 is arranged with a varying cross-sectional area to change the acoustic impedance to control the directivity of the sound pattern, to suggest that recess 418 is an acoustic horn as the Office contends. Indeed, Clark describes alternative embodiments in conjunction with FIGS. 6-8 that significantly alter the cross-sectional area of the recess 418. Yet, Clark describes that the "alternate assembly [of FIG. 6] may operate the same as that described in relation to FIG. 5, and have the same performance as that described in relation to FIGS. 11-12. Col. 7, ll. 5962. Clark further states that with the alternate arrangement of FIGS. 7 and 8, the "sound pressure waves travel substantially the same as those described in relation to FIG. 5, and similar results as described in relation to FIGS. 11-12 are achieved". Col. 8, ll. 29-32.

Persons skilled in the art would understand that if Clark's recess 418 were truly an "acoustic horn", altering the cross-sectional area in the manner described in conjunction with FIGS. 6-8 could not produce substantially the same performance as the arrangement shown in FIG. 5. Accordingly, claim 1 is believed to be allowable over Clark for at least this reason.

In addition to lacking an "acoustic horn", Clark does not describe a driver as recited in claim 1. The Office asserts that the recited driver reads on Clark's speaker diaphragm 402 and voice coil 404. But the Office's construction again ignores the inherent characteristics of a driver needed to form an electroacoustic transducer together with the recited acoustic horn, as recited in claim 1. Persons skilled in the art would understand that the driver recited in claim 1, commonly referred to as a "compression driver", defines characteristics that are patentably distinct from the conventional speaker described in Clark.

According to the Radio Shack Unabridged Dictionary of Electronics, a compression driver is defined as "a speaker driver unit that does not radiate directly from the vibrating surface, but instead requires acoustic loading from a horn which

connects through a small throat to an air space adjacent to the diaphragm" (a portion of cited page is attached for reference). The Applicant's use of the term "driver" throughout the specification is consistent with the plain and ordinary meaning of a compression driver as understood by those skilled in the art. Moreover, these characteristics of a driver need not be expressly recited in the claims, as the characteristics are inherent by use of the term of art "driver" when recited in the context of an electroacoustic transducer having an acoustic horn.

As further evidence of the inherent distinctions that exist between Clark's conventional speaker and the claimed driver, the Applicant directs the Examiner's attention to the information available via the Internet at the URL "http://www.sweetwater.com/insync/word/compressiondriver", which describes that:

> the compression driver is a <u>special type</u> of dynamic loudspeaker . . . designed to fit onto the small end of a horn. The horn acts like an acoustic transformer, with the driver providing a high sound pressure level at throat of the horn, with the mouth of the horn providing a large area of low pressure to radiate the sound efficiently into the air. They work by attaching a voice coil to a diaphragm (much like any tweeter) whose surface radiates sound into the horn through a small opening known as the throat, which is where the compression occurs. (emphasis added)

The Examiner's attention is further directed to the information available via the Internet at the URL "http://melhuish.org/audio/horndriver.html", a portion of which states that:

> Horns require compression drivers. These transducers produce high pressure but little displacement. The diaphragm therefore moves very little, which results in less distortion than a conventional radiating driver. Horn drivers need high magnet strengths to produce the high pressure. <u>Ordinary radiating drivers do not usually meet the requirements of a compression driver, so you cannot just horn load a normal cone speaker</u>. (emphasis added).

The above-cited information was accessed on May 4, 2004, and copies of the material as it existed on this day is attached for reference.

Interpreting Clark's conventional speaker (referred to by Clark as a "speaker", not by the term of art "driver" as in conventional when describing an acoustic horn) disregards the ordinary meaning of the term as would be understood by persons skilled in the art at the time the invention was made, which again is improper. <u>See, e.g.</u>, MPEP §§ 2173.02 and 608.01(o). This is especially true here, as Clark's ported

speaker arrangement, having a plurality of openings 124 that allow sound waves to escape, must generate even less sound pressure than a conventional non-ported speaker arrangement. Accordingly, claim 1 is believed to be allowable for this reason as well.

With respect to independent claims 5 and 7, these claims define features that are substantially similar to the absent features of claim 1 identified above. Accordingly, claims 5 and 7 are considered allowable for at least these same reasons as claim 1. The remaining claims, which ultimately depend from one of claims 1, 5, and 7, are considered allowable for at least these same reasons.

Notwithstanding the above, the Applicant disagrees with the Office's assertion that claims 4 and 12 are obvious in view of Clark. The Office admits that Clark does not explicitly describe that the membrane 402 has a diameter less than 1 mm. Nevertheless, the Office contends that:

> because the Applicant's specification describes no criticality for the specific claimed 1 mm driver membrane, it would have been obvious for one skilled in the art to use any speaker technology, including the 1 mm diameter membranes, in Clark, as long as the basic concept of providing an acoustic frequency response that is substantially efficient within the practice of the phone operation.

Applicant respectfully disagrees.

Persons skilled in the art would understand that the use of a speaker having a diaphragm 402 in the range of 1-5 mm, much less a diaphragm less than 1mm, in Clark's arrangement could not produce sufficient sound pressure to produce any audible sound. This must be true, as the efficiency for a conventional speaker, much less Clark's ported arrangement having a plurality of openings 124 that allow sound waves to escape, is known to those skilled in the art to be many orders of magnitude lower than the efficiency of an acoustic horn. Accordingly, claims 4 and 12 are considered allowable for these reasons as well.

It is believed this application is now in condition for allowance. An early Notice to this effect is earnestly solicited. If the Examiner has any questions, he is invited to telephone the undersigned at the number given below.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: ______________________
Stephen J. Tytran
Registration No. 45,846

P.O. Box 1404
Alexandria, Virginia 22313-1404
(919) 941-9240

Date: May 4, 2004
Attachments - 4 Pages

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______________________
Stephen J. Tytran

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**acoustic homing system**—A missile guidance system which responds to noise radiated by the target.

**acoustic horn**—Also called horn. A tube of varying cross section having different terminal areas which change the acoustic impedance to control the directivity of the sound pattern.

**acoustic impedance**—Total opposition of a medium to sound waves. Equal to the force per unit area on the surface of the medium, divided by the flux (volume velocity or linear velocity multiplied by area) through that surface. Expressed in ohms and equal to the mechanical impedance divided by the square of the surface area. One unit of acoustic impedance is equal to a volume velocity of one cubic centimeter per second produced by a pressure of 1 microbar. Acoustic impedance contains both acoustic resistance and acoustic reactance.

**acoustic inertance**—A type of acoustic reactance which corresponds to inductive reactance in an electrical circuit. (The resistance to movement or reactance offered by the sound medium because of the inertia of the effective mass of the medium.) Measured in acoustic ohms.

**acoustic intensity**—The limit approached by the quotient of acoustical power being transmitted at a given time through a given area divided by the area as the area approaches zero.

**acoustic interferometer**—An instrument for measuring the velocity or frequency of sound waves in a liquid or gas. This is done by observing the variations of sound pressure in a standing wave, established in the medium between a sound source and a reflector, as the reflector is moved or the frequency is varied.

**acoustic intrusion detector**—*See* Acoustic Burglar Alarm.

**acoustic labyrinth**—A loudspeaker enclosure in which the rear of the loudspeaker is coupled to a tube which, at the resonant frequency of the loudspeaker, is one quarter of a wavelength long. The tube,

ulation.

**compound-wound motor**—A dc motor having two separate field windings. One, usually the predominant field, is connected in parallel with the armature circuit and the other is connected in series.

**compress**—To reduce some parameter of a signal as bandwidth, amplitude variation, duration, etc., while preserving its information content.

**compressed-air loudspeaker**—A loudspeaker that has an electrically actuated valve to modulate a stream of compressed air.

**compression**—1. A process in which the effective amplification of a signal is varied as a function of the signal magnitude, the effective gain being greater for small than for large signals. In television, the reduction in gain at one level of a picture signal with respect to the gain at another level of the same signal. 2. Electronic reduction of the dynamic range so that quiet sounds are raised and loud sounds lowered. The most common application is an "automatic" recording where it is important that all sounds recorded are made intelligible when played back. Also used where necessary to avoid overrecording and distortion, or to lift the signal level clear of background noise or hum.

**compressional wave**—In an elastic medium, a wave which causes a change in volume of an element of the medium without rotation of the element.

**compression driver unit**—A speaker driver unit that does not radiate directly from the vibrating surface. Instead, it requires acoustic loading from a horn which connects through a small throat to an air space adjacent to the diaphragm.

photons by electrons. Because the total energy and momentum are conserved in the collisions, the wavelength of the scattered radiation undergoes a change that depends on the scattering angle.

**computational stability** — The degree to which a computational process remains valid when subjected to such effects as errors or malfunctions.

**computer**—Any device capable of accepting information, applying prescribed processes to the information, and supplying the results of these processes; sometimes, more specifically, a device for performing sequences of arithmetic and logical operations; sometimes, still more specifically, a stored-program digital computer capable of performing sequences of internally stored instructions, as opposed to calculators on which the sequence is impressed manually (desk calculator) or from tape or cards (card programmed calculator).

**computer access device input** — A device that automatically routes to the computer all teletypewriter observation reports that are received in a standard format.

**computer-aided design**—*See* CAD.

**computer code**—Also called machine language. The code by which data are represented within a computer system. An example is a binary-coded decimal.

**computer control** — The parts of a digital computer that have to do with the carrying out of instructions in the proper sequence, the interpretation of each instruction, and the application of signals to the arithmetic unit and other parts in accordance with this interpretation.

**computer control counter** — 1. A counter that stores the next required address.

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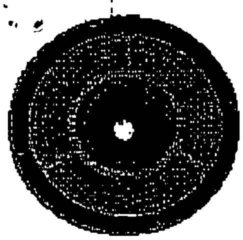
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 0-9

### Compression Driver

Developed by Bell Laboratories in the early 1930's the compression driver is a special type of dynamic loudspeaker (meaning it works just like a dynamic microphone, but in the opposite direction) designed to fit onto the small end of a horn. The horn acts like an acoustic transformer, with the driver providing a high sound pressure level at throat of the horn, with the mouth of the horn providing a large area of low pressure to radiate the sound efficiently into the air. They work by attaching a voice coil to a diaphragm (much like any tweeter) whose surface radiates sound into the horn through a small opening known as the throat, which is where the compression occurs. There are many sophisticated design variables involved in producing a high quality compression driver.



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# Horn Drivers

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Horns require compression drivers. These transducers produce high pressure but little displacement. The diaphragm therefore moves very little, which results in less distortion than a conventional radiating driver. Horn drivers need high magnet strengths to produce the high pressure. Ordinary radiating drivers do not usually meet the requirements of a compression driver, so you cannot just horn load a normal cone speaker.

Cone drivers that will work usually have a Qts of between 0.2 and 0.3 and large magnetic fluxes. For example, the Lowther full range driver has a Qts of 0.247 and so is suitable for horn loading (as well as direct radiating). Compression drivers are produced by JBL, Pioneer TAD, Onken, GOTO, and others, including Altec.

Bass horn drivers that have been recommended and used include the Electro-Voice EVM 12L, a driver with a Qts of 0.232 and an Fs of 55 Hz. For horn loading, you want a driver with a low Qts and a higher (relatively) Fs. Dividing Fs by Qts, we want greater than or equal to 120. The EVM 12L comes in at 237 (see Bruce Edgar's article "The Show Horn" in Speaker Builder, 2/1990).

The JBL Prosound division have a driver for bass applications along with some theory on horns at Technical Notes. Other good horn theory resides in scientific papers and magazine articles, see the References section.

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